

REMARKS

Claims 1-12 are pending in this application. This amendment amends claims 1, 2, 9, 11, 12, and adds new claims 13 and 14. Claims 1-14 remain for examination.

The Examiner objected to the specification for an informality. Through an oversight the word "identify" was used instead of the intended word "identity" at page 13 line 2. An amendment to the specification herein corrects this informality.

The Examiner objected to claims 1-12 for informalities.

Claim 1 is amended to provide an appropriate range for "n" of from 2 to 20. Basis in the specification for this amendment is at page 16, lines 16-17 (paragraph 66).

Claim 2 is amended to change "devices" to "units".

Claim 9 is amended to provide antecedent basis for the phrases "the heartbeat" and "the DASD". Basis in the specification for these amendments is found at page 11, lines 9-11 (paragraph 47) and page 7, line 17 (paragraph 32).

Claim 11 is amended to provide antecedent basis for the phrases "the heartbeat" and "the DASD". Basis in the specification for these amendments is found at page 11, lines 9-11 (paragraph 47) and page 7, line 17 (paragraph 32).

The above informalities having been corrected, the Examiner is respectfully requested to withdraw the objections to claims 1-12.

The Examiner rejected claims 1-8 under 35 U.S.C. 102(e) as anticipated by U.S. Pat. No. 6,073,218 (DeKoning). Claims 1-8 as currently amended are not anticipated by DeKoning. DeKoning has no provisions for the generation and detection of a heartbeat. Furthermore, the present invention and DeKoning differ significantly in performance. The present invention preserves channel capacity or speed in the face of failure of a connector, storage unit, or storage array controller (page 4, line 7; paragraph 11). The primary function of DeKoning is to allow direct access to shared LUN by coordinating I/O operations of two controllers, a process involving awaiting (column 24, line 20). The secondary controller 118.6 of DeKoning, which corresponds roughly to the present

passive storage array controller, is optional (column 23, line 32). The present invention always includes a passive storage array controller. Performance will be significantly reduced in DeKonig when the secondary controller is omitted and a primary controller or other component fails.

Accordingly, the Examiner is respectfully requested to withdraw the 35 U.S.C. 102(e) rejections.

The Examiner rejected claims 11-12 under 35 U.S.C. 103(a) as obvious over U.S. Pat. No. 5,928,367 (Nelson) in view of U.S. Pat. No. 6,343,324 (Hubis).

Nelson discloses a system having a preferably real time mirrored memory to which data are added substantially concurrently (column 2, lines 60-67). Both controllers in Nelson are active in that each controller is receiving data and is controlling storage arrays, in addition to mirroring the data of the other controller (column 10, lines 35-38). There is no passive controller in Nelson. Failure of one controller in Nelson of necessity means a decline in channel capacity or speed of operations, as a single controller is called upon to process data previously handled by two controllers. In Nelson the detection of state transition signals is through loss of a state transition signal granting it access to mirrored memory (column 6, lines 6-14) or by one controller sensing an incorrect state transition signal communicated from the other controller (column 5, lines 29-32).

Thus Nelson differs significantly from the present invention in which one passive controller serves to provide redundant capacity to as many as 20 active controllers. There is no concurrent mirroring of data in memories in the present invention. In addition, in the present invention the loss of heartbeat directly or indirectly activates a passive controller with the preservation of the channel capacity or speed of the system in the face of failure, with minimal redundancy of components (page 4, lines 6-9, paragraph 11).

Hubis discloses a system for controlling access by heterogeneous hosts to an array of storage devices. A single controller is involved. The information on the disks describes the nature of the hosts. There is no information providing a passive controller

with data necessary for the activation of a passive controller in order to take the place of a failed active controller.

The ability of the present invention to provide undiminished channel capacity or speed in the face of failure of an active controller provides an unexpected advantage to the present invention. There is no teaching in Nelson or Hubis to combine the teaching in these disclosures; and, indeed, such combination would not result in a system with the structure or advantages of the present invention.

Accordingly, the Examiner is respectfully requested to withdraw the 35 U.S.C. 103(a) rejections of claim 11 and 12.

Claim 12 has been amended to more clearly claim the matter regarded by the inventors as their invention.

New claims 13 and 14 have been added in order to more fully claim the matter regarded by the inventors as their invention. New claims 13 and 14 are identical to claims 9 and 10, respectively; with the added limitation that either the reporter controller may detect the failure of a heartbeat and activate the passive controller or the passive controller may directly detect the failure of a heartbeat. Basis in the specification for new claims 13 and 14 is found at page 11, line 19 to page 12, line 12 (paragraphs 49 and 50). The process disclosed in claims 13 and 14 provides redundancy in that the passive controller is signaled concerning the failure of an active controller by both indirectly by the reporter storage array controller and directly by the failure of the heartbeat from the defective active storage controller (page 12, lines 9-12 paragraphs 49 and 50).

The Examiner indicated that claims 9 and 10 were objected to, but would be allowed if modified to eliminate informalities disclosed in claim objections. Claims 9 and 10 have been modified to eliminate informalities.

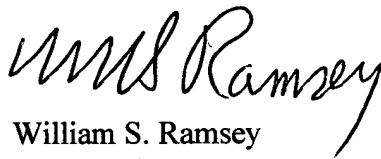
In view of the above, reconsideration and early allowance of the pending claims are earnestly solicited.

One independent claim (13) has been added by this amendment. The total number of claims (14) is fewer than 20. A check for the fee of \$43.00 for the additional independent claim is attached.

The Commissioner is hereby authorized to charge any additional fees which may be required for this amendment, or credit any overpayment, to Deposit Account No. 18-0158. In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 18-0158.

A DUPLICATE COPY OF THIS SHEET IS ATTACHED.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "W S Ramsey", written in a cursive style.

William S. Ramsey
Reg. No. 32,715
Attorney for Applicant
5253 Even Star Place
Columbia, MD 21044
(410) 740-2225

AMENDDIGI